

In re Patent Application of  
PIKE ET AL.  
Serial No. 09/741,754  
Filed: DECEMBER 19, 2000

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REMARKS

Applicants thank the Examiner for the careful and thorough examination of the present application. No amendments to the claims are being made and no new issues are raised by this response.

The Examiner continues his rejection of independent Claims 21 and 30, for among other reasons, the assertion that the "silicon gel" of Nguyen forms a hermetic seal with the high thermal conductivity ceramic substrate of Nguyen. It is respectfully pointed out that this is incorrect.

As an initial matter, Nguyen teaches that "silicon gel" cannot form a hermetic seal. At column 3, lines 5-8, Nguyen discloses:

"Furthermore, the IGBT power modules using standard package design cannot be hermetically sealed, and use silicon gel coatings and molded covers which are not approved for most military or high-reliability applications." (Emphasis added).

As Nguyen makes clear, its disclosed silicon gel coating does not form a hermetic seal. A further discussion of the "silicon gel" is found at column 8, lines 1-3.

"For commercial applications, the assembly of FIG. 13 may be coated with a silicon gel type of coating and covered with a simple cover."

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The Examiner cites to column 9 of Nguyen as support for the assertion that a hermetic seal is formed between the "silicon gel" and ceramic substrate. Again, this is not correct. Instead, a hermetic seal is formed between a solderable or weldable lid and a copper ring. The discussion from Nguyen is reproduced below.

"In order to satisfy the stringent requirements of military applications, the present invention is easily adapted to be hermetically sealed. As seen in FIG. 10, the IGBT switch of the present invention includes a collector pad CP separated from an emitter pad EP by a gap 40. Although a cover may be designed to fill the gap 40, it is preferable to modify the packaging structure in the manner shown in FIG. 19.

In FIG. 19, the emitter pad CP is elevated from the collector pad EP by an additional layer 120. A solderable insulated lid 122 can be adapted to fit over the emitter pad EP so as to hermetically seal the package within its walls. As seen in the elevated view of FIG. 20, a preferred embodiment of the present invention contemplates the use of a copper ring 124 for the emitter pad EP which can be used to solder or braze the hermetic lid 122. A weldable or solderable lid is required to be used with the ring 124.

As a further variation, a 'hockey puck' packaging design can be used. FIG. 21 shows the hockey puck design, wherein the wings of the emitter pad EP and collector pad CP are omitted. Instead, a metal (or other electrically conductive) lid 132 is welded or soldered to the copper ring 124 which is connected

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by wire bonding to the emitter terminals of the IGBT switch 126. The collector surface of the IGBT switch 126 is soldered to a copper plate 130. The hockey puck design also omits the lower BeO layer and opposing copper layer 128 of FIG. 19 in order to permit electrical connections to be secured directly to the top and bottom of the package." (Col. 9, lines 22-48). (Emphasis added).

Nguyen discloses only a conventional hermetic seal between a copper ring and a weldable or solderable lid, with the lid being either metal or other electrical conductor. Accordingly, Nguyen fails to disclose the claimed invention as recited in independent Claims 21 and 30, and indeed, Nguyen teaches away from the claimed invention. In view of the patentability of independent Claims 21 and 30, it is submitted that their dependent claims, which recite yet further distinguishing features of the present invention, are also patentable over the prior art and require no further discussion herein.

#### CONCLUSIONS

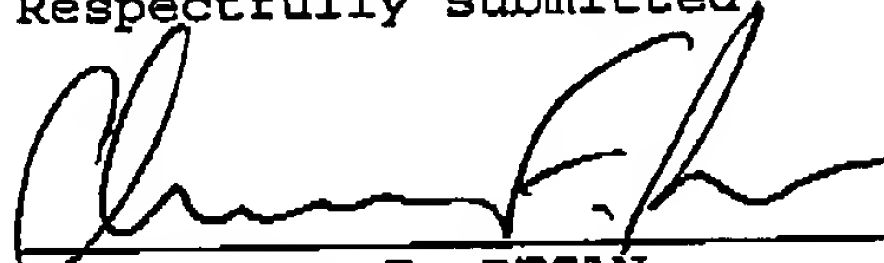
In view of the foregoing arguments, it is respectfully submitted that all of the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is

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encouraged to contact the undersigned attorney at the number  
listed below.

Respectfully submitted,



CHRISTOPHER F. REGAN  
Reg. No. 34,906  
Allen, Dyer, Doppelt, Milbrath  
& Gilchrist, P.A.  
255 S. Orange Avenue, Suite 1401  
Post Office Box 3791  
Orlando, Florida 32802  
407-841-2330  
407-841-2343 fax  
Attorney for Applicants

**CERTIFICATE OF FACSIMILE TRANSMISSION**

I HEREBY CERTIFY that the foregoing correspondence has been  
forwarded via facsimile number 703-872-9306 to the Commissioner  
for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 this 15<sup>th</sup>  
day of March, 2004.

